CLAIMS:

1. A gas-phase process for the catalytic conversion of a lower alkane comprising at most 5 carbon atoms to at least one product selected from the group consisting of alcohols, aldehydes and mixtures thereof, the process comprising bringing a said lower alkane into contact with an oxidising agent in the presence of a catalyst comprising at least one platinum complex.

2. A process as claimed in Claim 1, in which the catalyst is a heterogeneous catalyst, each platinum complex being supported on a catalyst support.

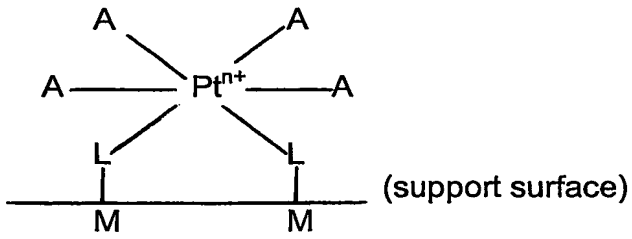
3. A process as claimed in Claim 2, in which the catalyst support comprises at least one solid metal oxide, the support having a surface to which each platinum complex is chemically bonded.

4. A process as claimed in Claim 3, in which each metal oxide is selected from the group consisting of alumina, silica, titania, zirconia, molybdena and mixtures of any two or more thereof, silicon and molybdenum for this purpose being regarded as metals.

5. A process as claimed in Claim 4, in which each catalyst support comprises a plurality of said metal oxides.

6. A process as claimed in any one of Claims 3 – 5 inclusive, in which each platinum complex has two ligands which are chemically bonded to the surface of the catalyst support.

7. A process as claimed in Claim 6, in which the catalyst has the structure:



in which:

each L is a ligand selected from amino ligands, hydroxyl ligands and imidazolyl ligands;

each A is a ligand selected from hydroxyl ligands, chloro ligands and amino ligands;

each M is a metal cation of the catalyst support and is selected from the cations of aluminium, silicon, zirconium, titanium and molybdenum; and

n is an integer selected from 4, 2 and 1,

the Pt of the catalyst being a platinum cation having a valence state selected from the valence states (IV), (II) and (I), corresponding to the numerical value of n, said platinum cation forming a central core of the platinum complex, the L ligands and the A ligands surrounding the central core, and the L ligands acting chemically to bond the complex to the surface of the support, under which surface the metal cations M are located.

8. A process as claimed in any one of the preceding claims, in which the catalyst, including the catalyst support, has a platinum content of 1 – 6 mg/cm^3.

9. A process as claimed in Claim 8, in which the platinum content is 2 – 5 mg/cm^3.

10. A process as claimed in any one of the preceding claims, in which the lower alkane is methane, the catalytic conversion being direct catalytic conversion by partial oxidation of the methane to form a product selected from the group consisting of methanol, formaldehyde and mixtures thereof.

11. A process as claimed in any one of the preceding claims, in which the oxidising agent is molecular oxygen, the oxidising agent being contacted in the gas phase with the lower alkane.

12. A process as claimed in Claim 11, in which the molecular oxygen is diluted by molecular nitrogen.

13. A process as claimed in any one of the preceding claims, in which the lower alkane and oxidising agent are mixed together to form a reaction mixture, the reaction mixture being brought into contact with the catalyst at a reaction temperature which is above ambient temperature.

14. A process as claimed in Claim 13 in which the reaction temperature is in the range 60 – 120°C.

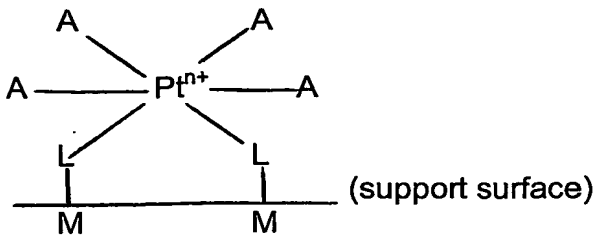
15. A process as claimed in Claim 13 or Claim 14, in which the reaction mixture is brought into contact with the catalyst at ambient atmospheric pressure.

16. A process as claimed in any one of Claims 13 – 15 inclusive, in which the catalyst is supported on a solid support contained in a reactor, the reaction mixture being fed into the reactor and into contact with the catalyst at a space velocity of 2 – 20cm^3 reaction mixture/cm^3 reactor volume/minute.

17. A process as claimed in any one of Claims 13 – 16 inclusive, in which the catalyst is supported on a solid support contained in a reactor, the support having a porous surface and a porous interior, and the reaction mixture being passed in the reactor over the supported catalyst and through the porous interior of the support.

18. A process as claimed in Claim 17, in which the support is in porous sheet or tube form, the support separating a reagent inlet to the reactor from a product outlet from the reactor, the reaction mixture being caused to pass through the porous interior of the support in a direction from the inlet to the outlet.

19. A catalyst for use in a process as claimed in any one of Claims 1 – 18 inclusive, the catalyst having the structure:



in which:

each L is a ligand selected from amino ligands, hydroxyl ligands and imidazolyl ligands;

each A is a ligand selected from hydroxyl ligands, chloro ligands and amino ligands;

each M is a metal cation of a solid catalyst support comprising at least one metal oxide selected from alumina, silica, zirconia, titania and molybdena, M correspondingly being selected from the cations of aluminium, silicon, zirconium, titanium and molybdenum; and

n is an integer selected from 4, 2 and 1,

the Pt of the catalyst being a platinum cation having a valence state selected from the valence states (IV), (II) and (I) and corresponding to the numerical value of n, said platinum cation forming a central core of the platinum complex, the L ligands and the A ligands surrounding the central core, and the L ligands acting chemically to bond the complex to the surface of the support, under which surface the metal cations M are located.

20. A catalyst as claimed in Claim 19, in which:

each ligand L is selected from amino ligands and hydroxyl ligands;

each ligand A is selected from hydroxyl ligands and chloro ligands;

each metal cation M is silicon; and

n has a value of 4,

the platinum cation of the catalyst having a valence state of (IV).

5

21. A catalyst as claimed in Claim 19 or Claim 20, the catalyst support being in porous sheet form, the porosity of the sheet permitting passage of a gas-phase reaction mixture through the sheet from one side of the sheet to another.